NOV. 14 '02

POPULAR MECHANICS

An Illustrated Weekly Review of the Mechanical Press of the World

Tells you how to do things. Written so you can understand it.

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The World's Greatest Salmon Fishery

Where Hundreds of Tons of the Squirming Fishes are Scooped from the River and Strewn in a Great Continuous Pile Along the Shore

IN THIS ISSUE:

Great Salmon Canneries on the Columbia River.
Two-Story Electric Bus in London.
Wireless Messages from Moving Train.
4,453 Miles of Railroad Added Last Year.
American Airship Promises Well.
Saved Washington Monument From Collapsing.
Largest Suspension Bridge in the World.
Great Double Locomotive of the Alps.
Easy Electrical Experiments:—How to Make an Electric Bell.
Electricity a Source of Feminine Loveliness.
Born, Married and Buried at Sea.
Largest Store in the World.
Portable English Electric Light Plant.
Folding Life Boat.
Great Land Yet to Be Explored.
Wave Power Motor.
New Ice Saw.
A New Age of Elevator Building.
Stunned Burglars with Gas.
Beautiful Designs for Southern Gourds.
Shop Notes:—What Becomes of the Heat in the Coal—A Home-Made Tuyere—Cellulith—How to Recharge Dry Batteries—First Trip of the Seven Master—Footpower Hammer—Steel Toggle Bolt—England's Famous Woman Iron Worker—Nelson's Gunners and Ours—Simple and Safe Storage for Gasoline—Steam Reversing Gear of Locomotives—Making Fuel from Peat in Canada.

WORLD'S GREATEST SALMON CANNERIES.

Tons of Writhing Fishes Hurried From the Water Through Improved Machinery Into Sealed Cans.

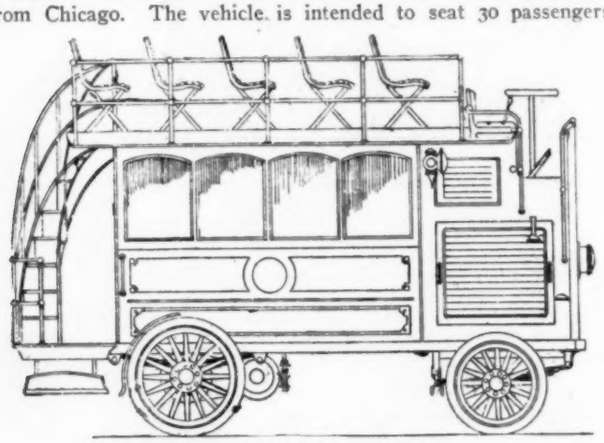
The canning industry is assuming enormous proportions in Portland, Ore., the center of the greatest salmon fishery on earth. Here are several of the world's greatest canning factories and the new and improved machinery that has recently been added to these immense establishments is a source of astonishment to persons not familiar with it. Here it is only a little while from the time the writhing, squirming salmon is taken from the water until he is securely incased in cans ready to serve on tables in different parts of the world. The manufacture of nets and all kinds of fishing tackle has become an enormous enterprise in Portland.

Salmon are found in enormous quantities along the Pacific coast all the way from San Francisco Bay to Bering Strait. But from the Columbia river, the stream that seems to be alive with salmon, comes the greatest part of the supply that feeds these great canning establishments. Probably in no other stream in existence can fish be dipped out in such overwhelming quantities as from this remarkable river. The illustration shows the result of a single day's catch. The pile of fish is many feet deep and the picture shows but a small section of the lengthy shore which is strewn with the fish in the same manner. The salmon are caught with nets.

Enterprise, that most entertaining and handsome of Pacific coast publications, in reviewing the salmon industry of the season just ended, says: "The total pack of the 14 canneries is 137,000 cases, or 100,000 cases more than was packed last year. Seven hundred tons of frozen steel heads have been put up. The total amount of fish taken from the Columbia during the season exceeds 28,000,000 pounds, equal to 43,000 cases. The value of the prepared product is about $3,000,000."

TWO-STORY ELECTRIC BUS IN LONDON.

A remarkable new electric omnibus has made its appearance in London and is the design and construction of an American from Chicago. The vehicle is intended to seat 30 passengers



London Bus Designed by an American.

and, as will be seen, is designed to satisfy the Londoner's desire to sit on top of the car. The overall length of the bus is 17 feet and it can go at a fair average speed of 10 miles an hour. The diameter of the front wheel is 36 inches and the rear 40 inches. The bus weighs 9,500 pounds. The batteries and steering arrangement are similar to those of the electric motor cars in service in American cities.

Sioux City is experimenting with a shipment of flour to London by way of New Orleans. If good time is made the route will be adopted.

WIRELESS MESSAGES FROM MOVING TRAIN.

Remarkable Experiments Conducted By Noted Scientists on Canadian Railroad.

Wireless messages between a train going at 60 miles an hour and the railway station at St. Dominick, Canada, were exchanged during recent experiments conducted by Drs. Rutherford, Wilson and Boney and Prof. McLean of McGill University. The feat was performed on the occasion of a trip of the general passenger and ticket agents' special train between Toronto and Montreal. Communication was opened eight miles before reaching the St. Dominick station and was continued for the same distance beyond.

This successful experiment is of the utmost importance in that it seemingly demonstrates the practicability of using wireless telegraphy for railroad service at short distances and may mark the beginning of a new era of dispatching trains and transmitting all kinds of messages on land as well as at sea.

4,453 MILES OF RAILROAD ADDED LAST YEAR.

Phenomenal Progress in Mileage and Earnings Shown By Statistics.

The enormous growth of railroads in the United States during the fiscal year ending June 30, 1902, proves better than anything else the wondrous prosperity of our country and the great progress it is making. In the one year 4,453 miles of new railroad were added. This brings the total mileage up to the enormous figure of 198,000 miles, 195,000 miles of which are now in operation. To operate these roads one year costs $1,092,154,099. The gross earnings for the year were $1,612,448,826. The net earnings, including miscellaneous receipts, were more than $588,000,000. There are in service on these roads 1,409,472 freight cars; 27,144 passenger cars, 8,677 mail and express cars and 39,729 engines. Besides all this rolling stock, which would seem abundant to carry on the commerce of any country, more is being turned out every day. Locomotive works are behind with their orders and car works cannot turn out freight cars fast enough to supply the demand. The railroads have not enough rolling stock to transport the freight offered to them.

AMERICAN AIRSHIP PROMISES WELL.

Machine Being Built in California May Beat All Records.

An American airship may after all solve the problem of aerial navigation. A machine from which much is expected is being constructed at San Jose, Cal., by Capt. Thomas S. Baldwin, the world's most noted balloonist. The aerial ship is the invention of Dr. J. Greth of San Francisco. The inventor has made a careful study of Santos Dumont's experiments and he expects to construct a ship that will have all of the virtues of Dumont's machines and none of the faults that caused them to fail. The machine will cost $5,000. The balloon part will be made of silk canvas covered with netting made from heavy Irish linen. Its dimensions will be 25 by 90 feet. Captain Baldwin, builder of the machine, is the inventor of the modern parachute and made the first parachute descent at San Francisco, Nov. 30, 1883.

SAILS A SHIP 150 YEARS OLD.

Sweden has the oldest vessel in the Baltic, perhaps in the world, in the schooner Emanuel, built in 1749, first a pirate and now used in the lumber trade. The Danish schooner Maren, also in the lumber trade, was built in 1800, is still seaworthy and has been owned by one family for 102 years.

SAVED WASHINGTON MONUMENT.

It Was Once Threatened With the Fate of the Campanile.

Few people who now view with admiration the magnificent Washington monument remember that it was once threatened with a fate similar to that which befell the Campanile at Venice. It was before the structure had reached completion that it was saved from collapsing by Major-General, then Capt. Davis. After the great shaft had risen to the height of 197 feet and rested there like a rough factory chimney, an unfinished eyesore for 20 years, congress determined to complete it and gave the job to the army.

Built on the edge of the Potomac marsh, the shaft had already leaned five feet out of plumb and nobody could be found to set it straight and insure its permanent stability until Davis, lately a quartermaster, then an infantry captain, volunteered to lift the hundreds of tons of masonry back to the perpendicular and build under it a foundation that would permit the lifting of its top to the highest point ever attained by a monument erected by man.

To hold the soft earth in place he built a huge barrel a hundred feet in diameter around the base and drove it deep into the earth below the tidal level. He bound together the enclosed mass with piles and braces, weighting it all down with stones and concrete, until he had secured a stability that would endure forever.

Then he wedged up the monument and put an everlasting foundation under it and finally turned the work over to the engineers under Col. Casey, who eventually set the capstone 555 feet above the earth.

Up to this date the great structure has not moved a hair's breadth, and frequent inspection demonstrates how wonderfully Davis planned.

The process of coining United States money will be illustrated in the United States mine exhibit at the St. Louis world's fair. The bureau of engraving will show, so far as can be done legally, the method of printing United States postage stamps.

A good quality of gas is being made from peat in Sweden.

Largest Suspension Bridge in the World

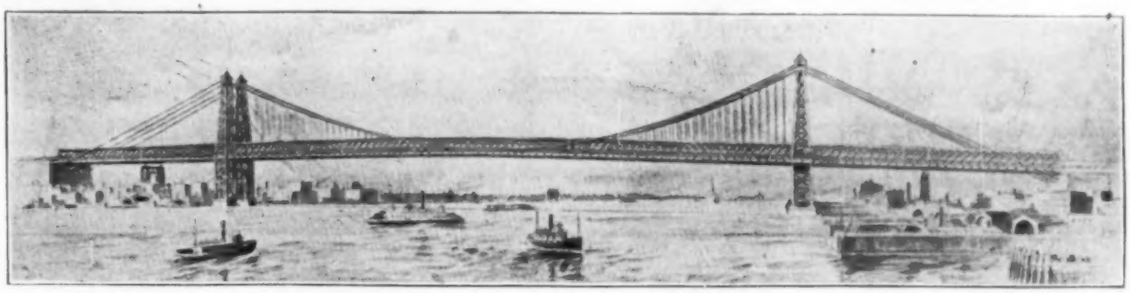
Building of the Great Span Across the East River Between New York and Brooklyn

Between New York and Brooklyn is being built the largest highway suspension bridge in the world. The bridge will be completed in about two years and will have cost about $8,000,000. The entire span is 1,600 feet, which is 5 feet longer than the great Brooklyn bridge. It is 320 feet longer than the famous bridge at Clinton, Canada, and 780 feet longer than the suspension bridge over Niagara river. The bridge will span the East river between Delaney street, New York, and South Sixth street, Brooklyn. Its total length including, spans and approaches, will be 7,200 feet, the approaches on both sides being about 1,200 feet longer than those of the Brooklyn bridge. The width of the bridge will be 118 feet or 33 feet wider than the Brooklyn bridge. It will carry six railway tracks as against four of the old bridge and there will be two wide roadways. In the accompanying illustration is shown men at work on the temporary foot bridge engaged in the work technically called "cable making."

"Poised High in Air with the Hurrying Torrent Below."

This is perilous work poised high in air with the hurrying torrent below busy with the passing of vessels in the never ceasing rush of commerce. It required three months to build the foot bridge. This bridge is only temporary, its object being to afford the workmen a foothold. The foot bridge consists of twelve 2½-inch cables, arranged in four groups of three each. Each cable is about 4,000 feet long and stretches from the anchorage on one side of the river to that on the other.

The old steam engines that are soon to be discarded from the Manhattan Elevated railroad in New York are being sold at prices from $1,500 to $3,000 each.

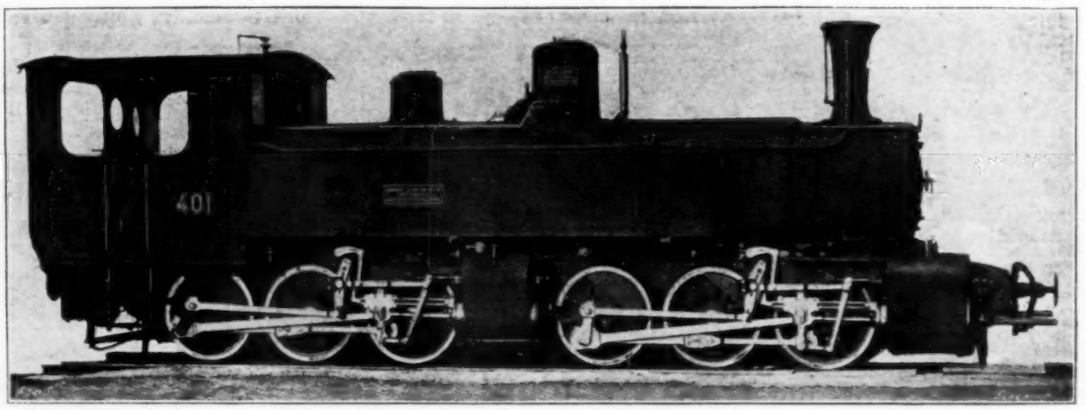


The Largest Suspension Bridge in the World, as it will appear when completed.

DOUBLE LOCOMOTIVE OF THE ALPS.

Queer Duplex Giant Made to Haul Heavy Trains on Curves and Steep Grades.

A queer looking locomotive designed to climb the grades and wind the curves of the Alpine regions in Switzerland has recently been built by the Swiss Locomotive Works at Winterchur. It is something of a "Siamese Twins" of a locomotive—two locomotives in one. It is a 12-wheel coupled compound duplex tank locomotive designed and built on the Mallet system. Its principle dimensions are: Gage, 39.37 inches; diameter of high pressure cylinders, 18.90 inches; stroke, 21.66 inches; diameter of driving wheels, 3 feet 3.7 inches; rigid wheel base, 7 feet 2.6 inches; total wheel base, 21 feet; heating surface of firebox, 83.96 square feet; heating surface of tubes, 834.23 square feet; total heating surface, 918.19 square feet; grate area, 16.146 square feet; pressure of boiler, 215 pounds; weight empty, 79,365 pounds; weight in service, 98,000 pounds; volume of water in boiler, 6,800 pounds; capacity of water tank, 8,800 pounds; capacity of coal space, 2,200 pounds.



12-Wheel Compound Duplex Tank Locomotive, Meter Gage.

The Railway and Engineering Review, a world authority on railroad affairs, says: Trial runs were made on a line 14 miles long, of which 2 miles are on a gradient 1 in 33.3 with a series of curves of 5 chains radius. The locomotive hauled with great ease a train of 120 tons at the speed of 12.4 miles per hour, and a train of 110 tons at 15.5 miles per hour. The road ordered four more locomotives of the same type. Upon a second series of trials the locomotive hauled a train of 155 tons up the incline of 1 in 33.3 at the speed of 9.3 miles per hour.

USING SOFT COAL IN THE HOUSE.

A well-known stove company in Syracuse has sent out the following directions for the use of soft coal in kitchen ranges and hot air furnaces:

KINDLING FIRE.

Ignite the fresh fire in the usual way, with paper and kindling wood (less of the latter). Use lumps about the size of an egg for the first fire.

REKINDLING OF FIRE.

Shake out the fine ashes, kindle as above, on top of the old coal left over when the fire went out.

DAMPERS AND AIR INLETS.

After the wood has burned and the soft coal is aglow, throw on only enough of the mixed lumps and fine coal to make not to exceed one-third to one-half the depth of the fire box or fire pot, as soft coal swells as it burns.

Let only a small amount of air in at the bottom of the range or furnace.

Open the air inlet of the broiling door of range or feed door of furnace so the air may go in over the top of the fire. This will aid to burn some of the smoke and should also prevent a sudden puff of gas from fire.

Keep the check damper to smoke pipe closed always. If a common damper is in the smoke pipe, that must be open all the time. Regulate the fire by opening and closing the slide of the broiling door of range and wheel damper in feed door of the furnace or the door itself.

FIRING.

Throw on only a small quantity at a time, spreading evenly over the entire surface; a larger quantity will cause too much smoke.

After the coal has coked, and before putting on fresh coal, run the poker into the crusted mass and break up the coke. Open the direct draft to smoke pipe and close the direct draft under fire.

CLEANING SMOKE PIPE AND CHIMNEY.

These should be cleaned every two weeks to remove the deposits of soot, which is an element of danger on account of fire.

MACHINE FOR SMALL BALES.

The illustration shows a new machine just patented, and the invention of C. H. Prasz. It weighs only 900 pounds and can be run with either steam power, one horse or a team. It will bale anything baleable. Bales weigh from 50 to 85 pounds, as desired. By putting on a hand crank the machine can be operated by one man for making 50-pound bales.

Prasz Baling Machine.

Easy Electrical Experiments

By L. P. Dickinson

HOW TO MAKE AN ELECTRIC BELL.

An electric bell is not a hard thing to construct, and it is often of great service about the laboratory of an amateur. Certainly the time and money spent will be repaid by the more intimate knowledge of this useful piece of apparatus, which will be gained through constructing it.

Take a piece of pine board 3¼ inches wide, 5 inches long and ½ inch thick. Cut away one end so that it has the shape shown in Fig. 1. The necessary dimensions are there given. Upon this board mount two wooden blocks shown at A and B. The former of these blocks is ⅞ inch long, ⅝ inch wide and ½ inch thick. The latter is ⅞ inch long, ¼ inch wide and ½ inch thick. Fasten them to the board by screws in the positions indicated by the dimension lines. At the top place two small binding posts, as close to the edge as possible. Sandpaper the whole very smooth, and give it a coat of cherry or other suitable stain.

Next take a piece of ordinary sheet iron, such as is used for stove pipes, and cut out four pieces, 1½ inches long and 1¼

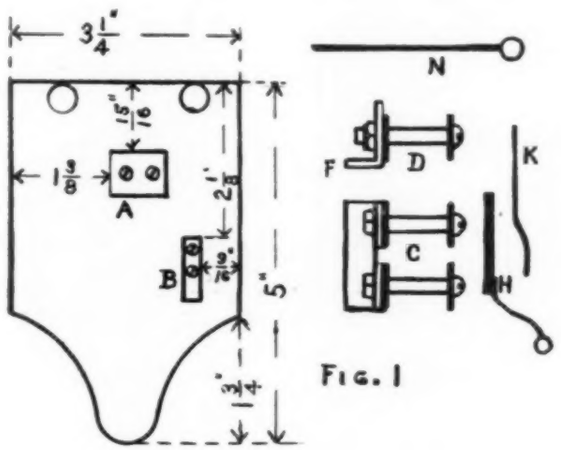


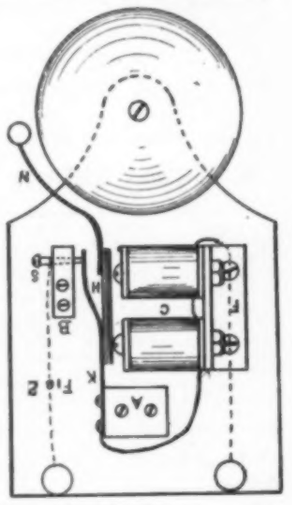
Fig. 1

inches wide. Clamp these four pieces in a vise with their edges even, and with the jaws of the vise lengthwise along the strips. Then with a hammer bend the strips over at right angles, as shown at F, Fig. 1. The portion of the strips held in the vise should be ⅝ inch wide. With a pair of heavy shears cut off their edges even where they have been bent. Bore, or punch two holes in each of the flat faces of these right angled strips, the holes being ⅞ inch apart and on the center line of the faces of the strip.

Procure at a hardware store two round head iron machine screws, 1¼ inches long and about 3-16 inch in diameter. The size known as No. 14 is about this size. Each should be fitted with a nut.

Make four very heavy cardboard washers about ⅝ inch in diameter with a hole in the center just big enough to slip upon the screws. Put two washers upon each screw, one being close against the head, the other at a distance of 1 inch from the first. Put the screw end of the screws through two of the holes in the right angled strips, as shown at C and D, Fig. 1. Now wind the space between the pieces of cardboard with three or four layers of heavy paper, cut into strips just wide enough to fill the space between the pasteboard washers, glueing it in place. The strips which were bent at right angles thus serve as a support for the screws when the strip is screwed in place upon the backboard (Fig. 2). Also, because they are made of iron, they serve to connect the two screws magnetically.

Upon each screw, in the space just described, wind about 50 feet of No. 26 double cotton covered magnet wire. This ought to fill the space quite full. Connect the two coils together in the ordinary manner, so that a current going around the coils will trace out an imaginary letter S, going around one coil in a direction opposite to that in the other coil.



At H, Figs. 1 and 2, is shown an armature built up by soldering together three pieces of tinned iron cut from an old can. These strips are 1⅜ inches long and ⅜ inch wide. To one end is soldered a wire 2½ inches long, provided with a small lead ball at its outer end.

To the other end of the tinned iron strips is soldered a strip of very thin hammered brass, shown at K. This strip is 2⅝ inches long. It projects above the tinned strips by ⅞ of an inch, and its lower end is cut narrow and bent out as shown at H.

If difficulty is experienced in attaching this to the strips, a small copper rivet driven through both, may help matters. At any rate its lower end should be bent out as shown, so as to rest against the screw S inserted through the block of wood B.

In our next chapter we shall see how to complete the bell and to wire it up.

QUEER SHIP SPEED PHENOMENA.

Torpedo Boats Make Better Time in Shallow Than in Deep Water.

J. Schutte, chief of the experimental station of the North German Lloyd Steamship Co., at Bremerhaven, points out that fast small craft like torpedo boats may run quicker in shallow than in deep water, and that their trial runs in so-called open water may be very misleading. His experiments with models demonstrate that boats whose length does not exceed 9.5 times the width, required in deep water an open channel of at least ten or twelve times their width. As regards the depth, the influence of the tank limits vanished for models of very large steamers only when the available depth was 10.5 times the draught, and for torpedo boats when the depth was 16 times the draught. Considering that modern torpedo boats 8 feet 10 inches draught sink by 20 inches at their usual speeds, so that the draught increases to 10 feet 6 inches, the trial runs should be performed in depths of 157 feet to 164 feet. The newest North-German Lloyd steamers, Kaiser Wilhelm der Grosse and Kronprinz Wilhelm, which do 2 or 24 knots, says the Shipping World, should have been tested in 275 feet of water to realize the speed they attain on the ocean. Other experiments demonstrate that in fleets of similar ships, the largest and broadest should lead, the smallest be the last, and that all should follow one another as closely as is safe.

The water coils of coach heaters on the Chicago & Alton railroad are to be heated by steam coils fed from a steam line extending from the locomotive.

Galvanized wire rope should never be used over drums and pulleys. Large drums and sheaves are necessary if you would get the worth of a wire rope.—The Draftsman.

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ELECTRICITY THE SOURCE OF FEMININE LOVELINESS.

Makes the Ugliest Beautiful, They Say, and Destroys All Signs of Age.

An electric battery with necessary attachments must now become one of the necessary fixtures of the boudoir of every woman who desires to become beautiful, according to the claims of the beauty doctors. In fact, it is claimed that this electrical apparatus is all that any woman needs to remove all traces of homeliness from her features and make her bewitching beyond her hitherto fondest dreams. The battery is strung with wires to which are attached an electric roller, an electric ball, an electric hair brush, an electric needle, an electric sponge and a connection to charge the water for an electric bath. The electric roller when moved over the face is said to take away all wrinkles; the electric ball smoothes the creases from the neck and shoulders and makes the chest plump; the charged hair brush will cause the hair to grow by invigorating the roots; the electric needle removes superfluous hair, moles, warts and other facial blemishes; the electric sponge is supposed to make the skin soft and tender; the electric bath invigorates the system. All these things the electric treatment will truthfully do—so say the beauty doctors. The entire outfit—battery and the requisite attachments—it is said, can be bought for $25.

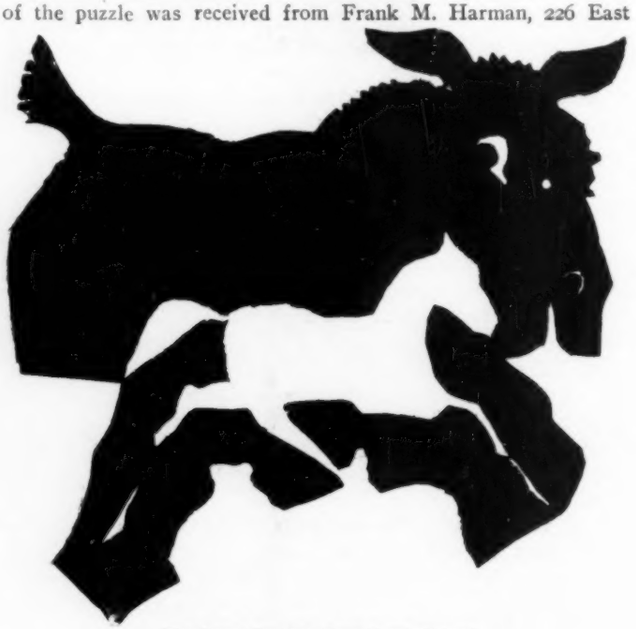
A MONSTER HAWSER.

A monster hawser 18 inches thick and 800 feet long was necessary to tow the immense pontoon dock which is now on its way from England to South Africa. It was made to order for this special use, of manila hemp, and was considered better than steel cables. Eighty days will be needed to make the trip with reasonably good weather.

Popular Mechanics "is written so you can understand it."

THE HORSE IS FIXED.

Many different appearing animals were made from the "black horse" pictured in the November 1 issue of Popular Mechanics and sent into the office. The first correct solution of the puzzle was received from Frank M. Harman, 226 East



The Smart Trotting Pony Puzzle Solved.

Main street, Ottumwa, Ia. The horse he succeeded in building is shown in the accompanying illustration. The smart trotting pony appears in the white surrounded by the black. The likeness is produced from re-arrangement of the three parts of the "black horse" previously illustrated. Others who succeeded in working the puzzle were Mrs. T. F. Montgomery, Wayne, Pa. Miss Jennie Cutshaw, Waverly, Ia., and N. H. Shipman, Corning, Ia.

SHIP, HIS CRADLE, HONEYMOON AND HEARSE.

Capt. Marsden Was Born, Married and Buried at Sea—Impressive Ceremony.

When Capt. Richard Marsden, of Gravesend, Eng., died recently, his remains were carried by kind friends to where the waves dash most furiously against the Goodwin sands and there placed beneath the waters that are never at rest. This form of burial was at the specific request of the captain before his death; for he had been born on a ship far from land, he was married in mid-ocean, and he willed his body to the sea as its dues for the delights it had afforded him in his younger days. Capt. Richard served in a nautical capacity all his life, and was captain for many years. For 19 years prior to his death he served as harbor master at Gravesend. Great interest was taken in the impressive burial ceremony by the local people, among whom the deceased had been very popular.

TO DAY.

So here hath been dawning another blue day;
Think, wilt thou let it slip useless away?
Out of eternity this new day is born;
Into eternity at night will return.
Behold it aforetime no eye ever did;
So soon it forever from all eyes is hid.
Here hath been dawning another blue day;
Think, wilt thou let it slip useless away?

—Thomas Carlyle.

Largest Store in the World

Chicago Establishment Long Held as a Standard of Excellence, Now Amazes the World in its Vastness and Completeness

From amid the superior comprehensiveness of Chicago's retail trade, which has made this city famous in many lands, has risen one greater retail establishment that may be regarded as the first wonder of the mercantile world. It is the remodeled, extended and enlarged establishmment of Marshall Field & Co., which, on the occasion of its recent opening was inspected by nearly two million people in one week. The wonderful stability of its mechanical construction, its vastness, splendid facilities and perfection of arrangement. even to the minutest detail, place it without a peer in Europe or America. The London Times and other great foreign publications have sent representatives to Chicago to write about this—the world's largest and greatest store, and American writers have vied with each other in describing its wonders.

The Bon Marche and the Louvre of Paris have long been famed among retail buyers as the two greatest stores, but they will now have to surrender their laurels to the far more complete and imposing establishment that has reared its walls among the skyscrapers of Chicago. New York and London have nothing to compare with the Marshall Field store either in mechanical construction or in the display of goods. The huge structure which faces four of the busiest streets in the very heart of the western metropolis, is a city within itself. It occupies 1,000,000 square feet or over 23 acres of floor space, which if leveled out would be equivalent to eleven blocks devoted to retail merchandise, and the stock and facilities would be sufficient to accommodate an entire city the size of St. Louis or Boston if there were not another store in the city.

The store has an army of over 7,000 employes. They receive better treatment than those of any other similar establishment in existence. They are provided with a gymnasium with shower and other baths for their exclusive use; in the store is a medical room where the employes are treated free when ill; a school for cash boys; a library, a waiting room, lunch room and music room for the women employes where they may spend the noon hour singing, playing the piano, and in social conversation.

Nowhere else in the world will the shopper find such an abundance of conveniences. For its patrons the store has a medical roon, separate from one for its employes. This room is fitted with all the latest medical and surgical appliances and an operating room that is as complete as any in the most modern hospitals. There are reception rooms which have no equal in American stores; a reading room, writing and rest rooms, equal to some of the city's wealthiest clubs; an efficient lost and found department; a thoroughly equipped information bureau; telegraph and cable office; office where tickets for theatres are sold; a library with all the current periodicals and magazines, representative newspapers from all parts of the country, and several hundred volumes of classic literature; a men's grill room; a women's tea room and restaurant where 2,000 can be seated at one time; men's and women's dressing rooms, with every possible convenience; lavatories and numerous other features of the kind such as no mercantile establishment ever attempted before.

The cold storage plant for furs on the twelfth floor of the new granite addition is a revelation to mercantile establishments. Between air tight walls on this floor has been created genuine arctic weather, the kind of weather the furs are accustomed to in their natural elements. The result is that they are kept in a state of preservation that is remarkable. No moths can exist in this storage room where the temperature is always kept 12 degrees

Retail House of Marshall Field & Co., Chicago, which for its Massiveness, Durability, and Marvelous Mechanical Construction is Proclaimed the Most Remarkable Mercantile Establishment ever Built.

below the freezing point. Moths that may be in the furs when they are brought there are quickly killed by the intense cold. Besides no effort of the furrier will work such wonderful results in reviving the fur as will a season in the cold storage. Rumpled hairs seem to become smoothed out, worn places disappear, and, unless too badly despoiled, the fur will often look almost like new when taken out.

In the building of this colossal retail emporium all that was best of the old and new methods was employed. No store in the world is so substantially built as this one. In this respect it is more like an ancient public building than an up-to-date retail house. A modern steel frame structure was reared on foundations as firm as any that ever supported a Grecian temple. The store was built to stand several centuries and in its substantial construction, therefore, a complete departure is made from the modern American practice of erecting buildings for temporary service without regard to the future. The modern steel frame and granite walls that reach 217 feet in air rest on 84 enormous concrete pillars, or "caissons," that extend down 100 feet into the earth to where solid rock is encountered. Thus the foundation of the Marshall Field & Co. store is in reality the hard rock strata far beneath the soil on which the city of Chicago is built. The construction of such a wonderful foundation was one of the engineering feats of the century. The pillars or "caissons" are from 6 to 9 feet in diameter and at the lower end are belled out to about three times this size. They extend down through soft clay, hard clay, loam and various other kinds of soil until the area of solid rock is reached. Each pillar weighs about 200 tons, has 2,400 cubic feet contents and will support 1,220,000 pounds. The contractor who did the work said:

"As a whole these 'caisson' foundations are vastly greater than have ever before been undertaken for any building."

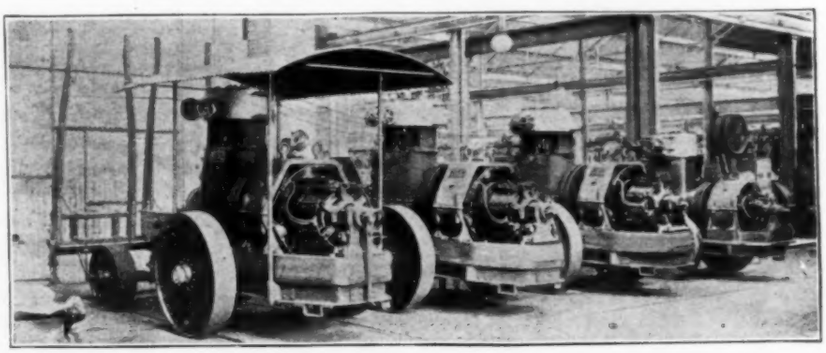
Electricity plays a most conspicuous part in making the store the great institution that it is. Two-hundred-and-fifty telephones are operated from the finest private switchboard in the world, requiring the constant attention of six expert operators. Fifty electric elevators are provided to haul the incessant stream of traffic through the perpendicular length of the building—to and fro—between the basement and the twelfth story. The contract for wiring the building with electric lights was the largest ever let to a single mercantile establishment in the history of the world. The equipment now includes 2,800 horsepower in motors and an equivalent in lighting of more than 40,000 sixteen-candle power lights

While Marshall Field & Co.'s store is the most modern it is at the same time one of the oldest retail houses in Chicago, and since 1865 has been a favorite shopping place for Chicago mechanics. It is this store's continuous "doing new things" and its putting into practice of new ideas that has caused it to become the world's criterion. Chicago sets the example to the world for the ideal retail store, and Marshall Field & Co. set the example to Chicago. It used to be in America, as it is yet in Europe, that a customer never paid the price first asked for an article. Marshall Field & Co. established a one-price system and other great dealers were quick to follow suit. In times past a purchaser after having bought an article had no recourse if the goods, on delivery, were found to be damaged or inferior. Marshall Field & Co. started the custom of permitting the customer to return any article found not to be exactly what it was represented to be. Other establishments were forced to announce that they would do likewise. Marshall Field & Co. originated the inexpensive basement feature, now a very popular adjunct to the new enlarged store; the firm was the first to establish the lost and found department; it originated the information bureau, and in fact almost every innovation that has worked toward the advancement of retail store facilities in America seems to have had its birth in the retail house of Marshall Field & Co. But with the big new list of additional facilities the great Chicago store seems destined to enjoy the benefits of its originality without important infringement for many years to come.

No other store has such a wonderfully cosmopolitan patronage as Marshall Field & Co.'s. It is as popular with men as with women. The millionaire and the tradesman here trade contentedly, each having learned that his needs may be supplied at a fair price, and that is all he wants. Every class of individuals and every nationality is represented in the great hosts of the store's patrons. All know that they will not here be victimized by any deception, whatsoever, either through statements of the salesmen, wording of advertisement or appearance of goods. This is probably the only store in the United States where the practice of artifice in the slightest degree is absolutely forbidden and where the purchaser is fortified absolutely against any kind of misrepresentation. At a time when America is gaining such an unenviable reputation because of the many adulterations in goods of all kinds and the numerous wiles employed in selling them it is gratifying to know that at least one store has a rigid policy to oppose these insidious methods and to protect the public from such impositions.

Portable English Electric Light Plant.

Electric search lights did much to protect the English troops from sudden attack at night during the war in South Africa, hence there arose a great demand for small electric plants that could be safely and easily carried about. The illustration shows some of the latest of such machines that have been invented. They comprise a complete power house, boiler, engine, generator and recording instruments. An output of 600 amperes at 105 volts is secured with the engine (which is direct connected) running at 400 revolutions per minute on 110 pounds of steam. The outfit is anchored to a bed frame which is carried on wide tire wheels built to travel on rough roads or no roads at all. Two horses are sufficient to draw the load which weighs nine tons. The wheels can be removed and the frame bolted down to a permanent foundation. One of these machines was set up on the royal yacht occupied by the king after his illness to avoid the vibration of the ship's generator. The engine is an inclosed compound.

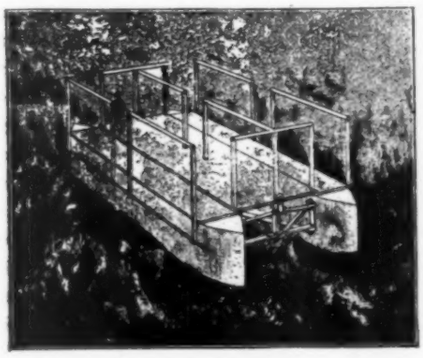


Electric Light Plants for Use in War Times.

Plans have recently been completed for thirty new oil mills in the south with a capitalization of $1,447,600. Alabama will have three capitalized at $300,000; North Carolina six at $292,000 and Tennessee four at $250,000.

FOLDING LIFE RAFT.

This raft is the invention of Alfred Sperber, an engineer in Dresden, Germany. The raft can be folded together or set apart as desired. In a folded condition it is of the size of a usual lifeboat, but when opened out is double its size. When the raft is needed for use it is put in the water, where it opens up of itself and appears as shown in the above illustration. The



Opens Itself in Water.

raft is so constructed that it can be used in stormy weather and does not capsize.

WANTED: A SUBSTITUTE FOR WOODEN RAILROAD TIES.

A great fortune awaits the man who will invent a practical railroad tie. With the 250,000 miles of track in this country using up each year 100,000,000 cross ties, costing nearly $50,000,000, we are fast approaching the day when the cost will be doubled. Then will follow a scarcity when ties cannot be had at any price. If all the railroads would plant trees along their right of way, in the course of say 25 years there would be a constant supply. Strange to say, few have done this. The Illinois Central has started in a small way, and others may do the same in time. The preserving processes have increased the life of wooden ties from six to ten or twelve years, but this has only been done during the past few years and by a few roads. In Europe and England cement ties are being used. The attempt to make metal ties out of worn-out rails has not as yet been successful. Here is a great opportunity for some bright mind to work out a hard problem. The reward, however, will be large and prompt.

According to reports in semi-reliable newspapers H. R. Palmer, of Cleveland, O., has invented a process by which the reproduction of a halftone over a telegraph wire is an accomplished commercial fact.

Readers of Popular Mechanics want ads. are not confined to a certain town or district, but they live in every section of the United States, Canada and Mexico.

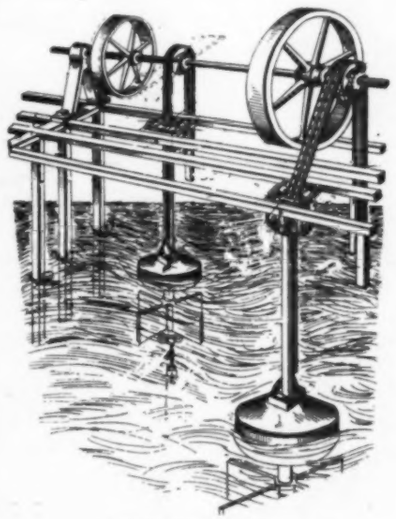
GREAT LAND YET TO BE EXPLORED.

Another Klondike May Be Found in the Interior of Baffinland.

A Yukon and a Klondike may yet be discovered in the interior of Baffinland. Here is the third largest island in the world, being exceeded in extent only by Australia and Greenland. Only the extreme southern coast has ever been explored. This land probably affords the most attractive field for the adventurer in the west at the present time. Its mineral resources are unknown; it abounds in splendid game and fish, and possesses enormous glaciers, one of which, besides being remarkable in its extent, is the most southerly glacier in Eastern America. There is also a wonderful system of great inland waters. According to the accounts of Dr. Robert Bell, the Canadian explorer who recently visited this strange and unknown land, lakes seem to be scattered everywhere among the mountains in southern Baffinland. Lake Amadjunk and Lake Nettilling, he believes, may be compared to Lake Ontario in extent. In the bright sunshine, says Dr. Bell, dwelling on the summer aspects of this far northland, the arctic flowers of many hues would be all wide open, and little butterflies of various species could be seen flitting about in considerable numbers, making the most of their brief time of enjoyment. Although the air was always cold on the water, by going a few miles inland on a bright day a different atmosphere was found, and a comfortable sense of warmth in the pure air was quite exhilarating.

WAVE POWER MOTOR.

In no way discouraged by the recent article on wave motors published in Popular Mechanics, inventors are still at work.



Gets Power from Waves.

One of the most recent machines intended to utilize the power of waves and tide is the invention of a Pittsburg man. Floats sliding up and down on a shaft pull a chain back and forth as the floats rise and fall on the waves. A ratchet wheel and pawl on the shaft insure its movement always in one direction.

NEW ICE SAW.

The following cut is from a sketch of a new rotary ice saw, the invention of Calim Stein. It is intended to be revolved very rapidly by means of a belt. It takes its power from the axle of the vehicle of which the machine is a part. It is for use in gathering natural ice.

Used in Gathering Natural Ice.

MAGIC OF NUMBERS.

Ask a friend to open a book at random and select and mark any word within the first ten lines and within the tenth word from the end of the line. Now, letting your friend do the figuring, ask him to double the number of the page and multiply by 5, add 20, and the number of the line, add 5, multiply by 10, to the answer add the number of the word in the line, subtract from this 250.

For example, we select page 73, double that will be 146, multiply by 5 is 730, add 20 is 750, add the line 8 is 758, add 5 is 763, multiply by 10 is 7630, to this add the word 9 of the line 8 which will be 7639, subtract 250 and you will always have the first numbers of the page, the second numbers of the line, and the last the number of the word selected. In this example 73 is the page selected, 8 is the line selected, 9 is the word selected.

This is excellent practice for mind training.

An ocean patrol for the salvage of property is proposed by Henry F. Craggs. He would have ten lifeboats and one supply boat. Each would have a regular patrol beat. It is suggested that the maritime nations form an organization similar to the Red Cross society, to bear the expenses and operate the scheme.

A New Age of Elevator Building

Fireproof Tile Structures Destined to Become the Universal Style of Grain Storage

Tile storage bins have established a new standard for elevator construction in America, the home of the elevator. When the first tile grain tanks were constructed in Minneapolis a few years ago they were looked upon as a curiosity and grain men who saw them turned away laughing. Since then, however, these very men that laughed have torn down their old elevators and had them replaced with the modern tile structures. Tile has steadily gained in favor since and the new structures are now rapidly supplanting those of other materials in the great string of elevators stretching across the continent. Official tests have been made which actually proved that large wooden buildings adjacent to a tile storage could be completely consumed by flame without injuring the elevator or its contents. In the accompanying illustrations are shown some of these new elevators built by the Barnett & Record Co., of Minneapolis, which are working such a sensational change in the old style of construction.

Fig 1.—St. Anthony Elevator, Minneapolis.

Fig. 1 shows the St. Anthony elevator at Minneapolis. The tanks are 50 feet diameter; 95 feet high and grain may be piled in them to a height of 85 feet. They have a capacity of 125,000 bushels. There is a belt elevator at the top and one at the bottom (Fig. 2) for filling or emptying. The workinghouse in connection with these tanks is shown in the foreground of Fig. 1. It is built of steel and encased on the outside with tile for fire protection. In this building is all of the elevator machinery, scales, etc. The scales shown in Fig. 3, with the weighman in the act of weighing are of 1,600 bushel capacity. The numbers on the hopper show how many bushels can be reached. Fig. 4 illustrates the interior view of the engine room showing cross compounding condensing engines of 1,200 horse power. The elevators are built of a combination of tile and reinforced steel members, in which hollow semi-glazed tiles of special form are used. The bins or tanks are built circular in shape, and the entire tensile strength required to resist the pressure of grain is furnished by the steel members. The walls are formed by bonding each course of tile blocks about 12 inches long by 12 inches wide and 6 inches thick, by means of channel-shaped tile, the flanges of the channels standing upward to form a trough in which steel bands are buried in mortar flush with the flanges of the tile. The tile blocks and channel tile are used alternately until the wall reaches the height required. At the same time an outside protection shell of tile is brought up and bonded to the main body of the wall so as to form a perfectly watertight covering and an additional fireproof surface to the structure.

Fig. 2—Belt Conveyor Loaded with Grain.

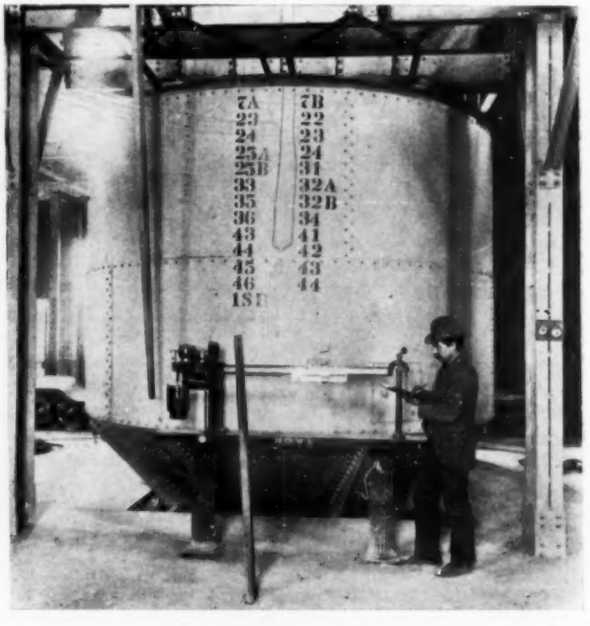


Fig. 3.—Weighing with 1,600 Bushel Scales.

STUNNED BURGLARS WITH GASES.

Anaesthetic Safe Was Supposed to Emit Poisonous Fumes Which Would Stupefy Robbers and Leave Them Unconscious on the Floor.

By the Hon. Hilligan Hodginson.

Down in Iowa a short time ago I was rummaging through a machine shop when I ran across a sheet iron box which seemed to have once been entirely covered with glass tubes attached to the surface by cement. All of the tubes were

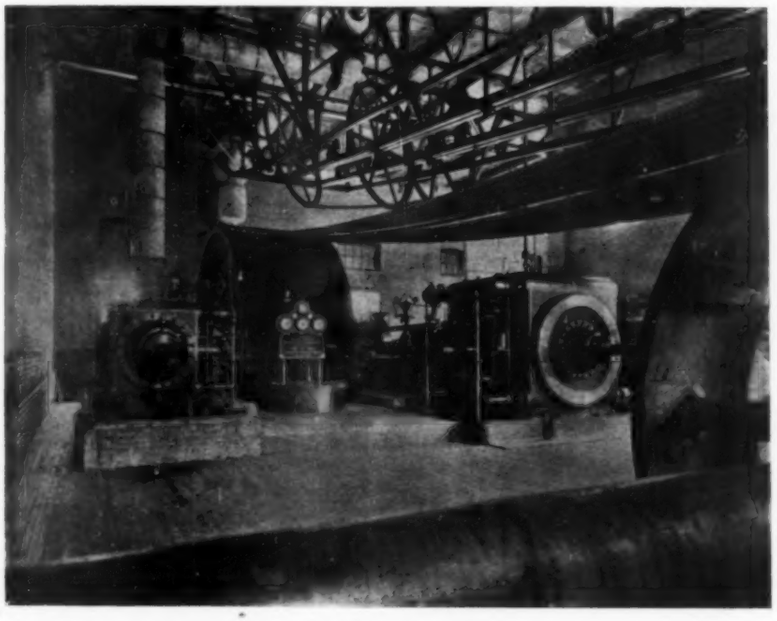


Fig. 4. Engine Room Showing Cross Compound Condensing Engine of 1200 Horsepower.

broken, but the general arrangement could be easily traced, and the contrivance impressed me at once with a sense of familiarity. Presently I remembered about it. It was all that was left of the one time famous "anaesthetic safe," an invention which ought to have been sponsored by a society for the prevention of cruelty to burglars. The idea of the thing was that any cutting or drilling through the outer casing should release certain chemicals which would promptly stupefy everybody in range of their fumes. In the morning the owner would find his valuables intact and could simply call a dray and pack off the unconscious burglars to jail.

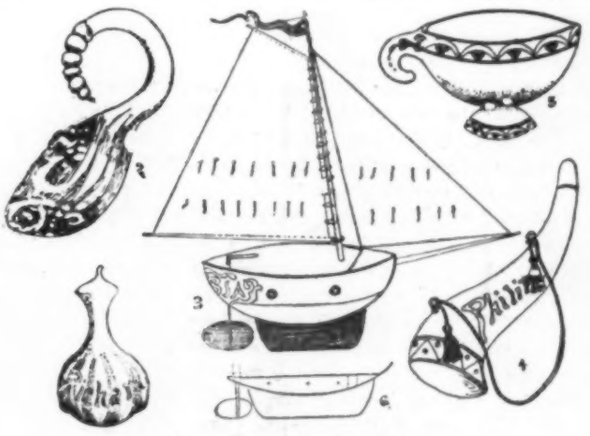
With such a device it was unnecessary to have massive steel walls, and the model which I chanced to resurrect was made of one-eighth inch sheet iron. The inner box was entirely surrounded with glass tubes about the diameter of a lead pencil and filled alternately with two chemicals which were supposed to produce stupefying gas when they came into contact. There was a thin outside casing, and the theory was that any effort to break in would necessarily fracture two or more of the fragile glasses. It seemed incredible, but several prominent capitalists became greatly interested in the scheme and stood ready to back it with unlimited means until actual tests finally convinced them of its grotesque impracticability. How the model ever drifted to the Iowa machine shop I couldn't find out. It had been there for years and was probably part of the plunder of some forgotten junk sale.

In using a copying pencil on bills of material, freehand sketches, etc., great help in getting good clear copies may be obtained by using a sheet of tin under the paper. This keeps the pencil from grooving the paper and two or three copies more may be made than by other methods.

BEAUTIFUL DESIGNS OF SOUTHERN GOURDS.

Nature's Drinking Vessels May Be Carved and Painted Most Artistically.

The time will come when the cultivation of gourds in the south will be as profitable as raising cotton and corn. Those living in the north who have never seen a gourd, and many of whom do not even know the meaning of the word, have no conception of the beauty of form it attains in its natural growth. The gourd is nature's make of household vessel and man has never yet made a piece of earthenware so beautiful and convenient. He who has not drunk from a gourd knows not how sweet water can taste. During the civil war when earthen ware and china became scarce in the southern states, coffee pots and cups, tea sets and all manner of serviceable vessels for household use were made of gourds. Some of them were very handsome in varied colors and designs of engraving. It is quite possible with water colors to paint designs on gourds equal to any done with mineral colors on china. They may be etched with acids, beautifully stained in different colors by dyes, or, better still, decorated with fire by means of heated metal points. Names, such as Richard and Philip, shown in the accompanying engraving, may be produced with little trouble in various ways. Perhaps the most unique is to cut the letters out of paper and paste them on the gourd while it is still green; then when it is dried and turned the pale drab it finally assumes the letters will appear in green when the paper is taken away; or the operation may be reversed, the letters cut out of paper and the paper itself pasted all over the gourd so that no light comes to it except where the name appears. In this case the letters will gradually turn a light drab while the rest of the gourd remains green. A still more expeditious way is to hold the gourd over a gas jet, after the paper has been pasted on, until the exposed surface browns.



Ornamental Designs in Gourds.

The accompanying illustrations show some of the many beautiful designs that may be attained with gourds.

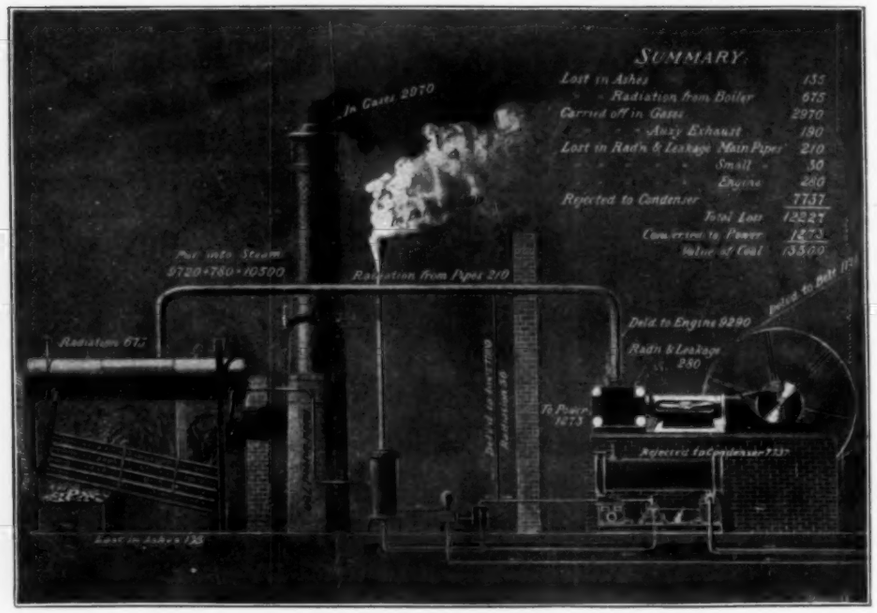
Gourds grow in almost every conceivable shape and size. In South America they attain such a size that they are made into children's bath tubs, wash tubs, etc.

An oil refinery costing $5,000,000 is being completed at Beaumont, Texas. The Standard Oil Co. are understood to be the operators of the new establishment which would indicate the oil resources of Spindle Top were considered lasting.

SHOP NOTES

WHAT BECOMES OF THE HEAT IN THE COAL?

When chemists succeed, if they ever do, in generating electricity direct from coal, instead of making it with a steam engine, there will be a saving of hundreds of millions of dollars over present methods. The steam engine is a most extravagant affair, for out of 100 pounds of coal burned to make steam to run the engine only from 6 to 15 pounds actually produce power that can be used. Eight pounds is a good average result; the balance of the 100 pounds is a dead loss. But where does it all go?



Showing Enormous Loss of Heat in Producing Power.

To start with, 22 pounds go up the chimney in gas and smoke; 5 pounds escape in heat which the boiler throws off; 1 pound or more drops through the grates with the ashes; 10 pounds are used up in pumping water into the boiler; 57 pounds get away in steam after going through the engine; and leaks and heat from pipes and engines use up the rest.

The most striking demonstration of this we have seen appears in Power for October, from which the data and accompanying illustration are taken. The figures given in the cut are in British thermal units. (B. T. U.), the generally accepted basis of measurement of boiler performance. An amount of coal which will produce 13,500 B. T. U. is taken and the various figures show what becomes of the units. Only 1,171 are delivered to the belt; all the rest are a dead loss, unless some use is made of the exhaust steam for heating purposes.

A HOME MADE TUYERE.

I have for several years used a simple contrivance for a tuyere in my forges, and they have given every satisfaction, says a correspondent in the American Blacksmith. Take a piece of heavy gas pipe about 1½ inches in diameter, long enough to reach from one side of the forge to the other. Enlarge one end so as to receive the point of the bellows well, and the other end is brought even with the opposite side of the forge. Drill a ⅝-inch hole at the point where the fire is wanted. Imbed the whole tube at the usual depth in the forge, covering all parts (except fireplace) with brick or clay, or both, and leaving a sufficient space for the fireplace. Insert a wooden plug at end of tube. After using for two or three weeks, some cinders will get in the tube, then simply remove the wooden plug, and using a rod with a small hook at the end, scrape it out clean. When good coal is used, such a tuyere will last for many years and stand quite heavy heats. The joints between bellows and tube make air tight with putty.

CELLULITH.

Brunswick's cellulith is produced by grinding wood pulp in a beater until an apparently homogeneous pulp, free from every trace of wood fibre, is obtained. This pulp, says G. Springer in the "Gummi Zeitung," is then drained of the bulk of its moisture by allowing it to run into a vat provided with a bottom of metallic gauze, and is subsequently dried, either in the air or in rooms at a temperature of 40 deg. C. The product thereby contracts very greatly, and forms, finally, solid masses of the hardness of horn, which are sold under the name of cellulith. Its specific gravity is about 1.5, it is not inflammable, can be worked with tools like wood or horn, and is very resistant to oils, fats, alcohol and petroleum. It is used as a substitute for horn, ebonite, buffing and polishing wheels.

HOW TO RECHARGE DRY BATTERIES.

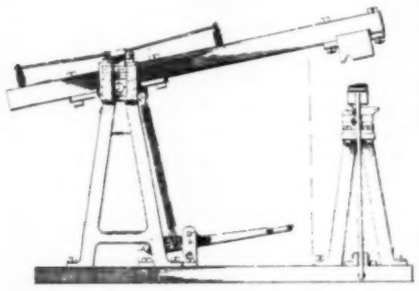
Dry batteries which have become exhausted can be recharged by a very simple process, says Motor Age. Remove the outer cardboard casing from each cell and drill six small holes in the zinc casing about one inch from the bottom. As four cells are generally used for ignition purposes in connection with the induction coil, get four small glass or stone jars an inch or so larger in diameter than the cells and about three-quarters the height of the same. Dissolve about a half an ounce of powdered sal ammoniac in each jar, in a sufficient quantity of water to bring it almost to the top of the jar when the cell is in it. Get four cells of gravity battery and put them in series with each other by connecting the zinc element of one cell to the copper element of another. Put each dry battery cell in the solution in its respective jar and connect the three binding posts on the zincs together, and the three carbon posts also, by means of insulated copper wire. Then attach the wire from the zincs to the zinc element of the gravity batteries, and the wire from the carbons to the copper element of the gravity batteries. Allow the cells to remain over night, and if they are of good, reliable make they will be found in the morning to be almost as good as new. This process of recharging dry batteries can be repeated at least twice and even three times, but of course after each successive recharging their renewed life will be shorter than formerly. After the batteries have been recharged the small holes which were drilled in the casing can be stopped by means of a strip of adhesive tape, covered with bicycle tire cement, and tightly wrapped around the zinc casing over the holes. The cells should be wiped thoroughly dry and then may be replaced in their cardboard casings and are ready for use.

FIRST TRIP OF THE SEVEN MASTER.

The largest sailing vessel ever built, the "seven-master," a description of which appeared in these columns recently, has just made her first trip. She carried 7,300 tons of coal from Philadelphia to Boston, being the largest cargo of coal ever loaded on a ship.

FOOT POWER HAMMER.

A Chicago man has devised an inexpensive machine to be used as a foot-power hammer. The beam carrying the



hammer is weighted so the hammer will remain poised above the anvil until brought down by the foot treadle.

STEEL TOGGLE BOLT.

This is a new bolt which has been put on the market. It is intended to use in securing molding, brackets or fixtures to walls or ceilings constructed of hollow

tile or other fireproofing, where nails or screws cannot easily be made to hold. The bolts are in eight sizes and will hold 400 pounds. The head is piveted to turn down parallel with the bolt that it may go through a small hole; a 2-16 bolt will pass through a 3-8 inch bolt.

ENGLAND'S FAMOUS WOMAN IRON WORKER.

It is not much of a place for looks—this work shop of the lady iron worker to the king—but the articles turned out are of the finest grade and most artistic workmanship. Mrs. Ames-Lyde has her office directly next to the work room proper, where from eight to ten men are kept busy making railings and gates for noblemen's parks, lamps for royalty's gardens and hallways and exquisite screens for milady's boudoir. She sits there, with chart, charcoal, pen, ink, pencils, and other paraphernalia, and develops the beautiful designs which are fast making her famous.

Mrs. Ames-Lyde is probably the most capable iron worker in England. She manages an establishment at Thornham and is largely patronized by the royal family including King Edward himself. In fact, royal folks of all nations patronize her. Some of her finest specimens of work have even penetrated Egypt. The young Khedive Abbas has a magnificent entrance gate to his palace which Mrs. Ames-Lyde designed and which was made in her shop directly under her eye. She herself handled some of the most intricate parts of the design.

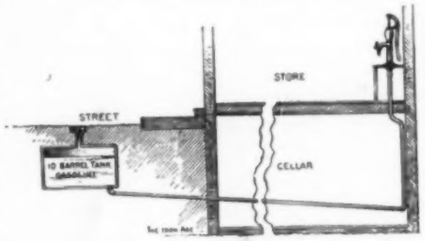
NELSON'S GUNNERS, AND OURS.

The mountings for ship guns and guns in coast fortifications are so designed and constructed as to throw into the power of one man, in so far as possible, the whole control of directing the gun at the desired target and firing it when ready, writes Capt. Meigs in Engineering Magazine.

The loading of the gun and the opening and closing of the breech block is performed to the rear of the man firing it, and therefore out of his sight, and certain interlocking arrangements in the firing apparatus are so devised as to prevent him from firing the gun unless the breech block is fully closed. Admiral Lord Collingwood, who was second in command to Nelson at the battle of Trafalgar, was in the habit of telling his men that, if they could fire three well-directed broadsides in two minutes, they were certain of victory. Their guns weighed about 2,400 pounds. The modern 6-inch breech-loading gun, which weighs 12,000 or 15,000 pounds, has been fired eight times within a minute at a target about 1,500 yards distant, probably quite three times the distance in Lord Collingwood's mind, and struck the target each shot. The difference here shown is due principally to the mounting. It is due, in some degree, to the fact that the modern gun is breech-loading, but the quicker rate of fire must be ascribed in large measure to the excellence of the mounting.

SIMPLE AND SAFE STORAGE OF GASOLINE.

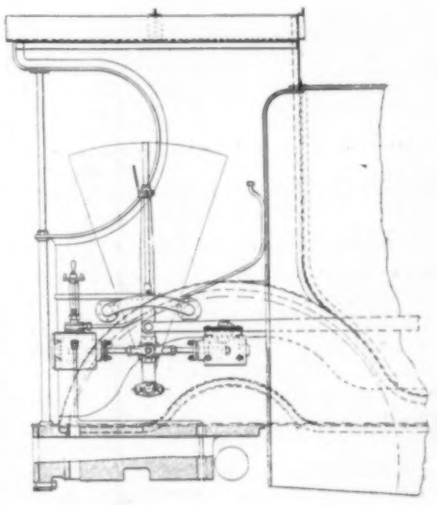
A dealer who handles a large amount of gasoline at retail put in the system illustrated below and finds it very satisfactory.



The tank, which in his case holds ten barrels, can be placed under ground in the street or back yard. A cock is placed at the end of the force pump.

STEAM REVERSING GEAR OF LOCOMOTIVES.

The new express locomotives of the Caledonian railway of Scotland are equipped with steam actuated reversing gear. The Railway Age says: The operation is effected by the piston of a steam cylinder—coupled directly to the ordinary reversing lever, the movement of the later being controlled by the piston of an oil cylinder placed in line with the steam cylinder and



on the opposite side of the lever. The oil cylinder is designed to act solely as a brake, the oil being forced by piston pressure out of one end of the cylinder and drawn by suction into the other. The upper part of the cylinder is formed into an oil chamber, which is in connection with the atmosphere. A small valve is located at each end of the oil chamber by which connection is made with the interior of the cylinder at the ends. The valves are so constructed as to give a large opening inwards for the suction of the oil and a small one outwards through which oil is forced by pressure. The size of the opening outwards regulates the speed of reversing.

The locking gear in one position is effected by the notch plate in the usual way.

MAKING FUEL FROM PEAT IN CANADA.

A fuel factory, or peat plant, near Stratford is turning out twenty-five tons a day of fuel that sells for $4.25 a ton. The plant cost $60,000, and the product makes an excellent fire. The works run night and day. The peat is cut up, dried and pressed into blocks. There is still great opportunity to improve on the drying process. Canada uses 3,000,000 tons of Pennsylvania hard coal each year.

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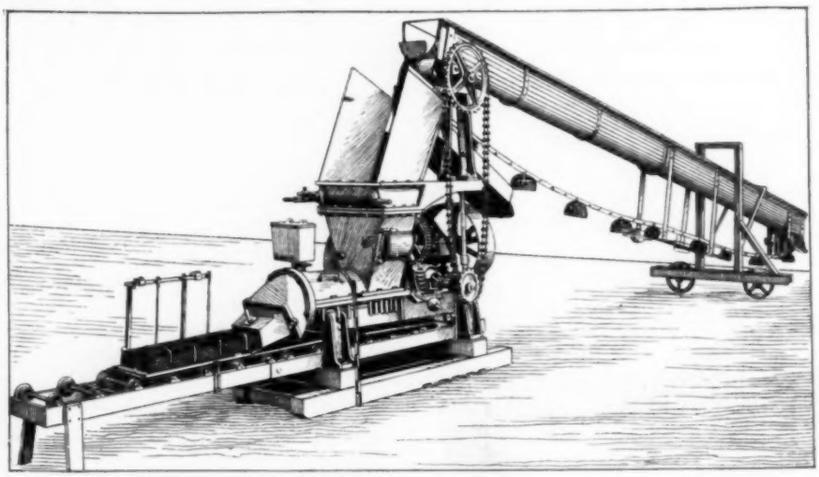
BRIQUETTES FOR FUEL.

Briquettes, which in Germany, are prized as high as the best coal for fuel, are made from brown coal (lignite), carbonized peat and coal dust or slack—the waste of soft coal mines. Those who desire technical information relative to the machinery or methods, the cost of plants, etc., should consult Mr. Robert Grimshaw, 9 Warmbucher Strasse, Hanover. Mr. Grimshaw is an American engineer of large experience on the subject.



The Briquette Machine.

ELDER RASMUS EXPLAINS PELEE DISASTER.

"De earf, my fr'en's, resolves on axels, as we all know. Som'fin suah am needed to keep 'em axels greased, so de good Lawd, in his wisdom an' foresight, put lots up petrolyum in de bowels up de earf for dat purpose. De Stan'ard Oil Company comes along an' 'strax dat petrolyum by borin' holes in de earf. De earf sticks on its axels an' won't go 'round no more. Dere is a hot box, jus' as tho' de earf wuz a big railroad train—an' then, my fr'en's. Pelee busts out and dere am trouble."

In all the large cities an important industry has been established in collecting old boxes. These are cleaned, rebuilt and sold at a good price. Several thousands of the old boxes are often stacked into one pile as high as a three-story building.

ENTERED THE RICHEST ROOM IN THE WORLD.

Sewer Cleaner Makes His Way to the Money Vaults of the Bank of England.

Years ago the directors of the Bank of England were startled by an invitation sent by mail to meet an unknown man in the strong room of the bank at midnight among the money chests. "I have been inside the bank the last two nights," wrote the man, "but I am not a thief; so meet me in the great square room with all the money at 12 tonight." Though the letter was regarded as a hoax, the police were notified and they guarded the strong room that night. Nothing happened. A few days later a heavy chest of papers and securities taken from the strong room arrived at the bank, with a letter complaining that the directors had set the police upon the writer and therefore he had not appeared as he promised; but to prove that he was neither a thief nor a fool he sent a chest of papers he had taken from the bank. Let a few gentlemen be alone in the room and he would join them at midnight, said the writer. This time his instructions were obeyed. Then a man with a dark lantern burst into the strong room of the bank at midnight after calling from behind the stone walls for the directors to put out the lights. He was one of a strange class of men who gained a living by searching the sewers at night, and through an opening from a sewer he had found his way into the richest room in the world.

M. Piscicelli, an Italian engineer, has invented a system of electric mail delivery, which, it is said, will carry mail at the rate of 248 miles an hour. The scheme provides for small aluminum boxes suspended from overhead trolley wires. The system may be put in service between Rome and Paris.

"Popular Mechanics is the only class paper worth while."—Jones K. Harvey.

DISMAL SWAMP PEAT FOR FUEL.

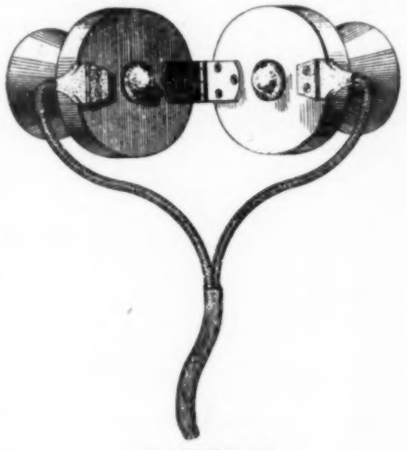
A very prominent and conservative expert recently called the attention of the Manufacturers' Record to the possibilities of the Dismal Swamp canal as a source of peat supply for fuel, which, according to his statement, would furnish the basis of very large operations. This peat, he states, could be so prepared as to make it suitable for fuel purposes, and and the supply is reported to be practically inexhaustible.

HOPS FIVE HUNDRED DOLLARS A TON.

There is greater value in a wagonload of hops than in a wagonload of anything else the farmer can raise. A ton of hops will sell this year for $500. The comparison with other products of the great hop district of Oregon is as follows: A ton of wheat is worth less than $20, a ton of potatoes less than $10, a ton of prunes about $90, a ton of oats about $20.

TELEPHONE TRANSMITTER FOR THE DEAF.

If you should see a person carrying in his hand a device like that shown in the cut, with wires extending to a receiver



For Deaf People.

fastened over the ear, you may be sure he is deaf. The sound collecting apparatus can be turned to catch the sounds coming from any two directions.

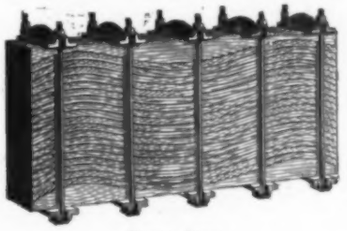
HOW SWELL DRAWER FRONTS ARE MADE.

To the purchaser of a swell front bureau it is always a wonder how the fronts were brought into the graceful curved lines. The illustrations show the new presses of Francis & Bro., Cincinnati, for producing these shapes and attaching a veneer at the same time. To do this some strong but inexpensive wood is cut into pieces of the desired size and steamed to make them pliable. A coat of glue is than spread upon each piece, and a very thin sheet of some expensive wood—called the veneer—is then laid upon the glue. A number of such pieces are then placed in a press, which is screwed down tightly. At the top and bottom of the pile are placed

Press for Drawer Fronts.

heavy forms, which cause the stock to bend to the shape of the moulds. After being "shaped" in the press, the contents are removed and placed in a clamp press, where they remain for many hours, until perfectly cold and dry. The shape thus secured is permanent.

The veneers are very thin, usually about



Clamp Press.

1-32 of an inch in thickness. Furniture, pianos, doors, mantles, tables, etc., thus veneered cannot be distinguished from the same articles made of solid mahogany or other valuable woods, except by experts skilled in woods and their manufacture.

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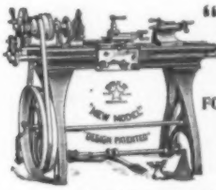

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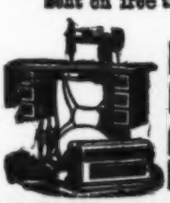

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